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SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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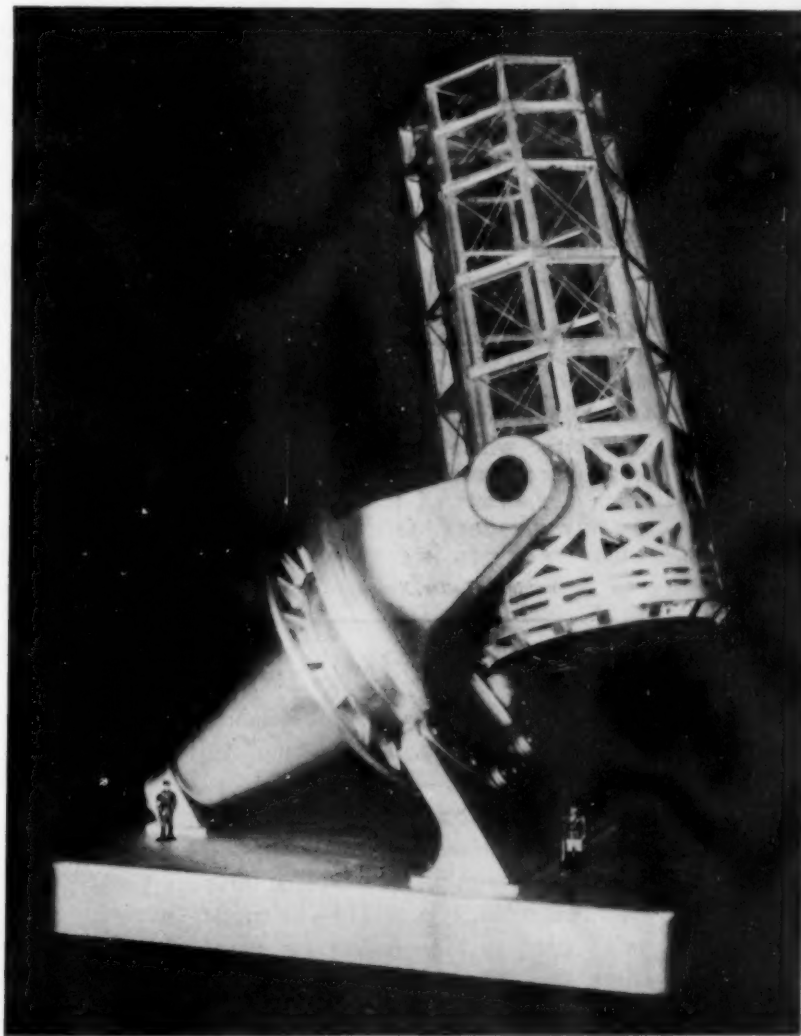


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November 2, 1929



STELLAR LOOKING GLASS

How 200-Inch Telescope May Look

(See page 267)

Vol. XVI

No. 447

Lack of Calcium Causes Temper

Physiology

Crossness, tiredness, misbehavior and all the other symptoms of problem cases, both child and adult, result when the blood has too little calcium, Dr. Walter Timme, of the Neurological Institute, New York City, has concluded. But whether dietary efforts to increase the calcium, by taking quantities of milk, fresh fruits and vegetables, and cereals, would relieve the condition, Dr. Timme has not said.

Scientists now think that the supply of calcium to the blood is controlled by the tiny parathyroid glands in the neck. When these glands reduce the supply of calcium there is apparently a disturbing effect on the nerves and subsequent conduct of the individual who then misbehaves, showing inordinate fatigability, irritability of temper, and at times even incorrigibility, non-amenability to discipline and assaultiveness.

"They were easily aroused to a high pitch of anger at the slightest provocation," Dr. Timme said. "A word,

an insinuation or even a glance being sufficient to arouse intense antagonistic reaction. These patients became problem cases at home, at school, or in whatever environment they found themselves, because of their non-adaptability and uncompromising attitude. Occasionally their behavior became so exaggerated that apparently hypomaniac states developed therefrom and several of these patients had to be confined in institutions until the symptoms were ameliorated. At home, a harsh word from any member of the family, at the table for instance, would result in a plate or knife or some other utensil being thrown at the aggressor. In school, a blow, a shout or a curse would be hurled at a fellow student or even at the teacher."

Upsets in the mutual relationships of the glands and nerves are responsible for many of the drug and alcohol habits and the easily led characters among the criminal classes, Dr. Timme said.

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Altitude Flights Dangerous

Physiology

When aviators fly to great heights, such as the altitude of 50,000 feet to which Lieut. Apollo Soucek, Navy pilot, aspires, they are endangering their lives even though they use oxygen devices.

This is the conclusion drawn from researches by Dr. Charles Richet, Jr., of the University of Paris, who conducted tests for the French Government.

Working with rabbits he found that they sometimes suffered a delayed death after coming through with seeming success the experience of being subjected to low atmospheric pressure equivalent to high altitudes. This was especially the case with the animals which were subjected to work after their experience, but some died without the stress of work being a factor.

Prof. Richet sets about 45,000 feet as the limit of altitude that can be reached by man with safety, even

when equipped with extra oxygen, unless the whole body is enclosed in a pressure chamber that shields him from the effects of the great height. Twenty thousand feet is the limit when no oxygen is supplied.

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Diet for Epilepsy

Medicine

Epileptic attacks may be controlled by a diet rich in fats, such as cream, butter, mayonnaise, bacon, and oil, combined with a reduced quantity of sugars and starchy foods.

Reporting on experiments carried on at the Chicago State Hospital, Dr. A. M. P. Saunders stated that of a group of eighty women epileptics, thirty-two were much benefited by the diet. The rest of the patients were those who had some other physical disease or were mental defectives and did not respond. With this diet the fat is only incompletely broken up in the absence of carbohydrates and a large amount of acid is formed during the digestion.

The diet must be estimated and adjusted for each individual case and the patient must be under medical supervision during the treatment, Dr. Saunders said. Some patients require only a slight change from the normal diet, and others a much more restricted diet. The patient's cooperation is necessary since, after the epileptic seizures have been brought under control, even so slight a thing as eating a piece of candy may again bring on seizures.

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Dullards Grow Slowly

Physiology

Dull children not only struggle along with a mental handicap but they are apt to be backward in physical development as well. This close linking of body and brain is shown by Dr. L. R. Wheeler of Tennessee State Teachers College, as the result of studying records of 273 children with subnormal intellect.

The group of dull children were below normal standards in height, weight and practically all other physical measurements.

Since growth is dependent on many influences, he suggests that schools should consider physical growth of a child when attempting to classify, teach, and promote him, especially if the child deviates widely above or below the normal growth for his age.

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Visible Space To Grow Thirty Fold

Astronomy

Telescopic power ten times as great as that given by the 100-inch reflecting telescope of the Mt. Wilson Observatory, now the largest in the world, will be at the disposal of astronomers when the 200-inch reflector of the California Institute of Technology is completed. It will penetrate three times as far into space as the 100-inch, and bring into view a globular region of space thirty times the volume of that reached by present-day telescopes.

Work on the new instrument is now under way. A model of the telescope, based on a design that has been accepted tentatively, but may be greatly altered after further study, is now on exhibition at the building of the National Academy of Sciences in Washington.

Two miniature figures, on the same scale as the model, indicate the size of the finished instrument if this design is finally accepted. It will be about 85 feet high when pointing near the zenith, about the same height as a seven or eight story office building. The tube is supported in a fork, so that it may be pointed to any part of the sky. The fork is arranged to turn in a direction parallel with the axis of the earth. A powerful clock drive will turn the instrument around this axis once a day, thereby keeping it pointed to the stars as they move across the sky. This arrangement is the same as in the usual equatorial mounting for astronomical telescopes.

Dr. George Ellery Hale, honorary director of the Mt. Wilson Observatory of the Carnegie Institution of Washington and chairman of the Observatory Council of the California Institute of Technology, describes in the current issue of *Harper's* the progress of the work on the telescope since it was started a year ago.

No actual construction work on the telescope proper has yet begun, but much necessary preliminary work has been accomplished. A tentative design for the telescope has been worked out. Plans have been completed for the astrophysical laboratory, on the Pasadena campus, of the California Institute, which will be the headquarters of the astronomers who will use the telescope, measure the photographs taken with it, and interpret them with the aid of laboratory experiments. Plans have also been made for the instrument shop where the smaller

telescope parts and many accessory instruments will be constructed, and for the optical shop, where the huge mirror will be ground and figured. While these plans were being drawn, Mt. Wilson astronomers engaged in a survey of a dozen possible sites for the new instrument.

Dr. Hale emphasizes the importance of choosing the best site for the telescope.

"We observe the stars from the depths of a turbulent atmosphere," he says, "which not only scatters and absorbs much of the light that reaches its upper levels, but so irregularly refracts the portion transmitted that the rays falling on the various parts of a large lens or mirror are rarely or never combined into a sharply defined and perfectly steady image."

"By selecting a site of high altitude, above the denser and more disturbed portion of the atmosphere, in a region but little affected by clouds and storms, we may greatly reduce these difficulties. In fact, the conditions on Mount Wilson are so favorable that on a very large proportion of the nights in the year the 100-inch Hooker telescope gives us a gain in light-collecting power over the 60-inch telescope fully in proportion to its greater aperture."

"The use of the larger instrument has thus resulted in many fundamental discoveries beyond the range of the smaller one, and has more than justified our most sanguine hopes. Moreover, we have direct observational evidence that on Mount Wilson a 200-inch telescope could be depended upon to show a further gain, in keeping with its increased size. The probabilities now are that we can find a still better site within a short distance of Pasadena."

The type of mounting shown in the model is not final, said Dr. Hale. It represents one satisfactory solution of the problem, and justifies further work. Should any other kind of mounting be suggested which would be still more advantageous it will be adopted. The great mirror, however, still remains a problem, but one to which a satisfactory solution is fully expected.

"In the days of Herschel and Lord Rosse the mirrors of reflecting telescopes were made of speculum metal, a silver-like alloy of tin and copper, which takes a beautiful polish and retains it for many years," he states.

"Subsequently, mirrors of glass, silvered on their front surface, were introduced and universally used. Glass is lighter than speculum metal, and silver reflects a greater proportion of blue light, though speculum metal is much more efficient as a reflector of the ultraviolet stellar rays. Moreover, as glass is a poor conductor of heat, the outer parts of large thick mirror discs change in temperature more rapidly than the interior as the air in the open dome grows warmer or colder from night to night. Thus their curvature is more or less affected, and this means that the stellar image, instead of being nearly a point, may often be expanded into a much less brilliant disc."

"The most promising means of overcoming this difficulty is to make the mirror of fused silica or quartz, which is not appreciably affected by change of temperature. Dr. Elihu Thomson and his associate, Mr. A. L. Ellis, had already solved at West Lynn, Massachusetts, many of the technical problems involved in the use of fused quartz, and our first step was therefore to secure their cooperation and that of the General Electric Company. President Gerard Swope immediately agreed to have the work done in the Thomson Research Laboratory at actual cost, with no charge for commercial or administrative expenses. The special methods required for producing large discs have since been developed, with every promise of success."

"The procedure adopted is to begin with the manufacture of mirrors of moderate size, then to undertake the 60-inch and larger mirrors needed for auxiliaries, and finally to make the 200-inch disc itself. A 20-inch disc has already been made, and the 60-inch stage will soon be entered. Some conception of the magnitude and difficulty of the ultimate task may be gained when it is stated that the fundamental problem is to construct a rigid concave mirror nearly 17 feet in diameter (200 inches), many tons in weight, whose surface is parabolically curved with an error less than two millionths of an inch."

"The process consists of fusing a mass of nearly pure silica sand in a circular electric furnace which constitutes the mold. The disc thus obtained, which contains innumerable small bubbles, is ground to the approximate curvature of the mirror desired and then (*Turn to next page*)

Babies Take Own Time to Develop

Psychology

Psychologists studying the behavior of young children have at last found a way to "have your cake and eat it too." That is, they have succeeded in giving a baby training that would alter the course of its development and yet they have been able to see what the youngster would have been like if it had never been trained.

This magic has been brought about by the Yale Psycho-Clinic, where Dr. Arnold Gesell and Dr. Helen Thompson have observed identical twin girls from the age of one month up to the age of eighteen months. Reporting their experiment in the *Genetic Psychology Monographs*, the psychologists say that it is doubtful if prolonged search could have secured for comparative study twins more extensively and profoundly alike than these. The blue-eyed blonde babies respond with remarkable similarity of behavior to almost any situation. In refusing or objecting, each twin's gesture is to turn the body slightly to the right and bend the left arm across the chest. When placed back to back and observed for several hours, their manner of handling a bell, spoon and other ob-

jects was strikingly similar.

For six weeks the psychologists gave one twin girl, T, a chance to practice climbing a set of five steps every day. Meanwhile, the other twin, C, had no such opportunity to learn the new activity. In the first three weeks of climbing lessons Twin T had to be frequently assisted. At the end of six weeks, when she was 52 weeks old, she climbed the steps in 26 seconds and was an enthusiastic climber. Yet when Twin C was introduced to the steps at the age of 53 weeks, she proceeded to climb the staircase without training or aid, taking only 45 seconds. At the age of 56 weeks T was climbing the steps in 11 seconds and C in 14.

Twin T was also given practice in handling cubes, the psychologists report, but her added early experience did not give her any advantage when Twin C was presented with three little blocks to bang with and to pile on top of one another.

The experience of the twins shows, according to Dr. Gesell and Dr. Thompson that a child begins to climb and to build towers with his blocks

when his nerve structures are ripe for such activities. Exercise may not even hasten the actual appearance of such reactions in a young child. The experience gained by early practice tends to be supplanted or modified by the process of the child's maturation. If it were not so, the infant could scarcely grow, they point out.

Twins identically alike offer a promising field for psychologists to study the difficult problems of human growth, the investigation indicates.

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New Magic

Electricity

The busy housewife who prizes the last few minutes of her morning rest may now turn on the current for the electric percolator by a mere wave of her hand. This and many other modern "magic" tricks are made possible by the electric grid-glow apparatus now available commercially. The apparatus is so constructed that when the hand approaches it a slight current is started. This can be used to turn on other electrical appliances.

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200-Inch Telescope—Continued

coated to a sufficient thickness with perfectly transparent quartz, free from bubbles. This crystalline quartz, in finely ground form, is sprayed on to the hot disc by means of an oxy-hydrogen flame; and the development of multiple burners needed for coating large surfaces without flaws has been one of the principal difficulties overcome. On this transparent face of water-clear quartz the final grinding, polishing, and figuring will be done. Finally, a thin coating of pure silver will be chemically deposited on the finished surface, just as is done periodically in the case of such glass mirrors as that of the 100-inch Hooker telescope on Mount Wilson.

While quartz seems to offer the most advantages, there are still other possibilities.

"Everything depends upon the success of the mirror, and we are therefore considering as possible alternatives several entirely different methods of construction, some of which are very promising," says Dr. Hale.

Probably the large disc could be made out of special forms of glass, such as pyrex, used in cooking utensils and laboratory glass ware.

The concentration of light by a telescope, and the speed with which photographic exposures can be made, depends on the ratio of the focal length to the diameter of the objective. It has been decided to make the focus of the 200-inch mirror only 55 feet, or 3.3 times its aperture. This would give it a speed of F.3.3, about the same as that used in lenses for motion picture cameras. If still greater speed is wanted, a special correcting lens, designed by Dr. F. E. Ross, can be used, which will increase the ratio to F.2. The ratio of the 100-inch telescope is F.5.

"During our own time spectrum analysis, initiated by Kirchhoff's study of the sun, has revealed the unity of terrestrial and celestial substance and provided the means of tracing the evolution of stars and nebulae and the systems in which they are grouped," Dr. Hale says, in pointing out some of the possibilities of the telescope. "Moreover, it has served as our guide to the true nature of matter and the advancement of the fundamental sciences of physics and chemistry.

"The first harmonic series of spec-

trum lines and the first ionized atoms (lacking one or more electrons), vital clues to the modern theory of matter, were found in the sun and stars. Quickly, with the aid of powerful telescopes the vast experiments performed for us in these celestial laboratories have added to basic knowledge. The three most vital tests of the Einstein theory can be made only with the telescope. Matter two thousand times as dense as platinum has been found in the companion of Sirius. Oxygen and nitrogen in 'forbidden' forms have been detected in the excessively rare gases of the Great Nebula of Orion.

"The transformation of matter into radiation, predicted by physical theory, is attested by stellar observations. And now we may hope that the problem of the curvature of space will be settled by celestial measures. Can one doubt that a telescope powerful enough to carry all these studies far beyond our present possibilities will prove profitable, not merely to the astronomer but to all who utilize the results of science in the many-sided problems of modern life?"

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Modern "David" Treats Ills With Music

Psychiatry

By EMILY C. DAVIS

Young David playing on his harp to drive the evil spirits away from Saul, King of Israel, has a modern counterpart in a Dutch harpist and psychiatrist, Dr. Willem Van de Wall. The modern doctor of music, however, has not only tried David's method of playing to the mentally sick, but he has found that music has possibilities that the Biblical boy hero never dreamed of.

Had Dr. Van de Wall been asked to give King Saul the benefits of musical treatment, he would probably have soon had the King singing with him one of Israel's beautiful old songs, rather than listening passively to the familiar strains.

More striking than this, Dr. Van de Wall induces mental patients to write musical plays, and to act, sing, and dance in them, according to their talents and physical abilities.

The simple idea of using music as medicine for mind and soul is ancient. It is one of the world's old discoveries, and harks back to Egypt and Babylon, to the Greek shrines of healing, and was remembered by physicians in the dark ages before the dawn of modern scientific medicine. The idea of using music in mental hospitals as a tool to arouse troubled minds and listless or rigid bodies to activity is a bigger discovery, and Dr. Van de Wall has been a chief discoverer and experimenter in this new field.

The early years of his musical career led the Dutch musician from the position of harpist in leading symphony orchestras of Europe to a place in the orchestra of the Metropolitan Opera Company. Watching the powerful effect of music on audiences and on the performers themselves, he began to wonder whether music could arouse beneficial emotions and desires in the inmates of prisons and mental hospitals—the two places where the people are out of step with society and need to face about and make a new adjustment to life. He began trying out some of his theories and they worked. In his present position with the Bureau of Mental Health of the Pennsylvania state government, he travels about the state bringing music into the institutions, and always making and applying new discoveries.

Human beings, well or sick, need music as a simple form of health in-



The fairy tale, "Snow White," works a new sort of magic. Mentally ill patients taking part in the play become gnomes, princesses, and witches and forget their unhappy isolation in their success as actors

surance, Dr. Van de Wall believes. For the person who is under heavy stress, music is a sedative. For the tired and depressed, it is a mental tonic. It is no patent medicine cure-all. It cannot alone heal diseases of mind or body. But it can stir up latent energies and desires in the inviolated, and it does have some effect on heart action, blood pressure, and glandular function, though its connection with such physiological processes is still not too well understood.

"Music does for the so-called abnormal mind identically what it does for the so-called normal," Dr. Van de Wall says. "It dispels the gloom of morbid isolation which delusions and hallucinations afford. It creates a direct, pleasurable, congenial, and beautiful environment in tones. It gives something much to be desired—esthetic sense-satisfaction. It overcomes the idler's state of indecision which is eating up the lives of thousands of people. It stimulates some of the drowsy patients to vigorous action, and many of the unsocial individuals to participation in socially constructive activities.

"Even those unfortunates who are too handicapped mentally and physically to fit into the normal scheme of efficiency and productivity demanded by society, find in the inspiration of music the power and the will to forget their weaknesses. They quickly drop their pathological moods and reflections, throw off their eccentric behavior, and sing, dance, act, and talk, exercising all the faculties they

have and often exhibiting more than they have shown in their previous abnormal condition.

"The appeal of music is so fundamental that with the least remnant of mentality left any one may enjoy music in some form or other, and also express himself in producing it, though this expression may be from a technical musical point of view without any artistic merit."

All of Dr. Van de Wall's hospital work is directed towards the goal of arousing the patients into a semblance of their former normal reactions to life. He comes into a ward, bringing a little portable organ. He opens and adjusts the little instrument, trying to be matter-of-fact in an abnormal atmosphere where several men are peering at him curiously, others are moving about with mechanical step, and some have failed to note that anything strange and new has come into the room at all.

He plays and sings a simple melody—"Old Black Joe," perhaps—not in the formal way that a concert singer would render it, but as it might be sung at home in the evening. He goes from one song to another, and presently voices join in, and the patients begin asking for the favorites, and faces lose the strange, alarming expressions. Before the little concert is over, a large percentage of these people who ordinarily keep themselves in desolate isolation are taking part in a social activity.

You might talk patiently for hours to some of these people, Dr. Van de Wall explains, (*Turn to next page*)

Modern "David" Treats Ills with Music—Continued



A Tule Indian giving a dose of rattle music to a sick man. He also sings a medicine song

in an attempt to probe their difficulties and get no encouraging answers. They are too afraid or too suspicious or too apathetic to respond. But the melodies talk a familiar, reassuring language and they gain confidence. Even the patients who will not talk at all, begin to sway rhythmically to the tune of "Little Annie Rooney" and move their lips, and afterwards sometimes they will talk a little about their troubles, and give doctors and attendants a glimpse into their queer, distorted world. And knowing why a patient clings to his line of erratic behavior is the first step toward aiding him to readjust himself to the everyday world. The music has an appeal that is more primitive than the other arts, Dr. Van de Wall explains. That is its secret of reaching these mental cases that have slipped back into speechlessness or childishness.

The musical doctor tells of one woman who suddenly rose from her place as he was playing to a group of patients and sang one prolonged note and sat down. He played on for her, varying the music and watching; for he knew that she had become ill twenty-three years before over the study of music. In her complete breakdown she had thrown her sweetheart out of the door and tried to kill her mother. Dr. Van de Wall shifted to Wagner's themes, and presently she stood up and sang the opening bars of an aria with the poise and some of the skill of the trained opera star. She broke off

abruptly, and said, "I thought I was in the Berlin conservatory again, but I am only in the insane hospital."

To arouse an apathetic patient even to so small an extent is often a victory for the hospital wards, for it means a step up in the climb towards social activity and rational thinking. The next time, the effort to speak and act may be less intense.

Giving a musical drama with orchestral accompaniment, costuming, lights, chorus, dancers, and star performers might well seem an impossible task if the participants are all to be mental patients. Play production is difficult at best. Yet at Allentown State Hospital the patients gave "Snow White" with great success, and the story of how such a play is produced shows how musical therapy reaches out to "shut ins" and brings them out of themselves in varied ways.

"To start with," Dr. Van de Wall says, "I select a number of patients representing, if possible, all the different types of wards, who will be benefited by taking part in the performance, or rather by taking part in the rehearsals. For hospital use, Shakespeare's famous saying must be changed from, 'The play's the thing,' into, 'The rehearsal's the thing.' The medical staff, of course, cooperates in the selection of the performers. These are then called to a number of editorial meetings where at a round table the play is written. We construct it as much as possible from the

players' suggestions as to dialog and action to fit the story, and so by this cooperative play writing we encourage thinking, imagination, and the outpouring of emotion along esthetic channels. After that come the rehearsals, and then the final performance is given, with patients and friends as audience.

"A single incident will illustrate the sort of personality changes that take place as the project advances. There was a sixteen year old boy who was sent in to the rehearsals. This boy Jack had come into conflict with the law and was at the hospital for observation. The judge wisely was waiting to know more about the boy's personality and the causes and cure for his delinquency.

"Jack interested me but I did not interest him. He demonstrated his antagonism by capturing a chair or two and hanging his arms and legs over the backs of the chairs so that they dangled to and fro like artificial straw limbs moving in the wind. Jack sat, and chewed gum, and refused to help in the proceedings.

"Meanwhile the play reached the point where the father of the Princess Snow White complains to his second wife that she neglects her stepdaughter. The patient playing the role of the king proposed to say:

"'Why dost thou neglect my child?'

"We were discussing this stilted line when Jack stopped dangling and said, 'I know, I know.'

"I said, 'Well, Jack, what do you know?'

"He answered with a triumphant smile, 'I know all about it. Believe me, I know what that king has to say. He would say to his wife, 'You have no motherly love for the child whatsoever. If I did not look after her myself nobody would.'"

"Amazed by this turn about, and struck by the dramatic line Jack had contributed, I asked how he thought of it. Whereupon that stolid, delinquent boy gave away the reason for the misery of life, the clue for which the court had been seeking.

"He said: 'I've been an orphan since I was a baby, and that is why I know all about it.'

"And after that Jack cooperated with the others, singing, dancing, going patiently through the laborious drills, simply because the fictitious Snow White, like himself, was deprived of motherly love. He projected his own (*Turn to next page*)

Sub Finder Not Yet "Sure Fire"

Physics

Rumors that the United States and other powers are willing to abandon submarines because a sure means has been perfected for locating them under water, even when "sleeping" on the bottom, seem to be without solid foundation. Information available indicates that the various types of supersonic listening gear, while moderately effective, are of too short range to be reckoned as generally effective from a military viewpoint. If, therefore, submarine construction is abandoned or restricted in the immediate future it will be a deliberate move in a peace program rather than the abandonment of an arm because it has lost its fighting value.

Statements have gained circulation lately that the British Admiralty has perfected a device for locating submarines at a distance. Such a device, if perfected, would, without doubt, mean the end of undersea fighting craft, for such boats are easy to destroy once they are located. But the range of the listening gear used in all navies of the world so far as known is to be measured in mere hundreds of yards rather than in miles, so that unless the sea were literally peppered with scout boats many submarines would be bound to escape detection.

Most of the locators of "silent" submarines known to military students depend on the propagation through the water of beams of sound-waves so short as to be inaudible to human ears—the so-called supersonic or ultrasonic waves. These can be produced from electrically excited crystals of quartz, somewhat similar to those used in radio broadcast stations for frequency control, but larger. These waves differ from ordinary sound waves in that they can be directed in a comparatively narrow beam, like the rays of a searchlight. They reflect as echoes from solid objects, and parts of these echoes are picked up by the listening gear on scout ships, amplified, and interpreted by observers. Similar devices, using audible sound waves, have been used for a long time in the well-known sonic depth-finding apparatus.

Work on supersonic submarine locators began during the World War, and has been carried on ever since, particularly by France, Great Britain and the United States. During the war their information was more or less pooled, but since then the researches have continued independently in each country. It is believed that progress in this country has been about equal to that abroad, although

necessarily most of the information about the technical details of the apparatus is kept confidential.

From time to time wild stories get into circulation crediting supersound with destructive power verging on the supernatural. These seem to be based on the experimental work on extremely short-length supersonic waves carried on by Prof. E. W. Wood of the Johns Hopkins University and Alfred L. Loomis, in the latter's private laboratory at Tuxedo Park, N. Y. This work, following observations made by Prof. Wood in the laboratory of P. Langevin at Toulon during the war, has shown that it is possible to kill small animals and microscopic plants with "rays" of supersonic waves in water. But they do not kill anything bigger than a tadpole or a goldfish, and they are never used in more than half a pint or so of water. So that using them to sink a submarine in the ocean, or to kill her crew at the distance of a mile, is quite out of the question. The significance of the supersonic researches of Prof. Wood and Mr. Loomis is not military, but purely scientific.

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Modern "David" Treats Ills with Music—Continued

experiences and sorrows into the drama. All the energies that had been monopolized by his resistance toward a difficult world were liberated, and he set them to work in the appealing and social undertaking of the fairy tale play."

The presentation of such a play is less important than the rehearsals, Dr. Van de Wall has said, and yet the evening of the performance brings more acute sensations and emotions to both the performers and to the patients who act as audience. Music's stimulus to the ear causes other senses to function in an increased way, he explains. And the music hall caters to most of the senses. There is color and light and the softness of velvet chairs and traces of perfumes. And on the stage there is the drama of love, conflict, and victory with the music intensifying the whole emotional tone of the events.

Music is the most powerful of the arts to evoke emotion, but even

music gains when it is thus allied to poetry, dance, and drama, the musician explains. The old Greeks made Apollo, god of music, also god of medicine. His son Aesculapius gained even greater fame in healing, and his daughters the Muses, linked poetry, drama, music, and the dance into one sisterhood. The whole family, in fact, resembled a family of mental therapists, and they are still indispensable to every mental hospital.

There has been a good deal of experimentation to see whether different rhythms would bring about specific changes in heart action or blood pressure or nervous energy. In time, it has been hoped, a science of musical therapy might be founded.

Dr. Van de Wall uses a wide variety of types of music in his informal concerts. A piece of music may have a different effect on different listeners, or even a different effect on the same listener at various times.

"The value of a musical composition as medicine," he states, "depends on

the influence it has on a certain individual or patient at a certain time in his particular life or state of disease. What kind of music will stimulate a patient, his energetic impulses, his physical and mental powers, feelings, thoughts and actions, depends, to a great extent, on his history and personality make-up. In the case of the patient, the physician, using the gauge of his experience, is the judge to decide about the curative value. The business of the musician is to cooperate with the physician in what could be called the musical prescription and application.

"The music serves as a stimulant of physical, mental, and moral energy and it is an essential medicine in the treatment and care of the physically, mentally, and morally weak, whether they are in an institution or not."

And creating harmonies and melodies is stronger medicine than listening, this musician to the sick has found.

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Plaster Casts of the Head Hunters

Anthropology

MABEL COOK COLE in *Savage Gentlemen* (VanNostrand):

After this comradeship had been established, my husband thought it would be safe to begin making life masks. The duties of the anthropologist are many: he not only makes pictures and takes body measurements of the people he studies, but he must, if possible, make life masks which can be used for study purposes and also be an aid to the sculptor who reproduces groups of the people in life size for the Museum. But making life masks of wild men is not easy. The scientist must be perfectly sure of his subjects' confidence and friendliness, he must overcome their alarm in submitting to a process that is not pleasant even to persons who appreciate the value of masks. I was uneasy when he plastered up their faces, for I was afraid they would be dead from suffocation when the masks were removed. I remembered the warning, "Only your names will come back to the village."

They all survived, but from the

Surgery Perils Minds

Psychology

Mental and emotional disorders may follow surgical operations, but the operations themselves are rarely the cause of the upsets, Dr. Robert B. McGraw of Columbia University explained to physicians gathered for the Graduate Fortnight of the New York Academy of Medicine.

The causes of mental disturbances after operations may be found in the mental and emotional make-up of the patient. The operation is generally only a provoking incident. The same disturbance might have been caused by any other happening that would have too greatly strained the patient's ability to adapt himself.

"Usually an operation is only an incident in the chain of circumstances leading to an emotional disorder as a breaking down of the adaptive ability of the organism. The adaptive ability of the patient breaks down at times of special stress," Dr. McGraw stated. "A serious operation may likewise be an important event in an individual's physical and psychic life and its effects both for good and for ill hard to measure."

Dr. McGraw advised physicians to consider carefully the emotional background of patients before urging any but emergency operations.

Science News-Letter, November 2, 1929

amount of hair and eyebrows that came off with the plaster, I think that some of them suffered a good deal. He gave a Dewey badge (which cost ten cents in Chicago) to each victim, and that healed all wounds. A man who was not keen about having his face plastered up wanted to buy one of the badges, and Bacilio informed him that it would cost five pesos. After that we had no difficulty in securing subjects. That was good pay for the loss of a few hairs.

Juan was a great help in working the plaster, and he really moved quite fast. Otherwise, of course, his hands would have set in the pans, as it was dental plaster and set quickly. When it was over, everything was covered with plaster—dishpan, washbowl, and every other available dish, to say nothing of the chair, floor, my husband, Juan, and the victim; but we were so relieved that there had been no casualties, that we did not mind cleaning up.

Science News-Letter, November 2, 1929

Unlucky Sabre-Tooth

Paleontology

The rare case of a big sabre-tooth tiger which lost one of its long sharp sabers while it was still a kitten has been discovered among the fossil bones of prehistoric animals taken from asphalt pits near Los Angeles, Calif. The kitten, which lost one of its most important permanent teeth, went about for the rest of its life with a strange one-sided expression. The socket soon filled in, and the dry skull which tells the story of the tiger's calamity has a peculiar snarling look where one side of the face was "lifted".

These big tigers of the prehistoric forest, which were literally armed to the teeth, were blood-suckers, depending on their sabers to pierce the hide of an animal chosen for dinner. Loss of both sabers would have forced a tiger to change its food habits completely, but this was apparently an almost unknown accident. Out of 1,000 sabre-tooth tiger skulls only three show loss of one saber. None had lost both. A few adult tigers in their active warfare for livelihood had broken a saber tooth down to a stump only about two inches. But the stump in such cases became covered over by a protective growth of dentine, and with this defective weapon the tiger carried on.

Science News-Letter, November 2, 1929

Tree Rings Date Ruins

Archaeology

The age of Pueblo Bonito and other famous Pueblo ruins in the southwest is at last to be revealed by the slow but sure detective methods of science. A telegraphic message received by Dr. Gilbert Grosvenor, president of the National Geographic Society, states that timbers from ancient trees collected this summer are adequate to complete the long-sought tree-ring calendar. With this as a yardstick it will be possible to date any prehistoric pueblo which has any wooden beams left in the ruins.

The principle of the tree-ring calendar is that the rings added to a growing tree each year vary in dry, moist, or average years, so that any given ring is like a dark mark. By examining cross-sections of old trees and tracing back the overlapping series of tree-ring dates, it has been hoped that the ancient beams found at Pueblo Bonito might be dated.

Dr. A. E. Douglass, astronomer, of the University of Arizona, and Neil M. Judd, leader of the National Geographic Society expeditions to Pueblo Bonito, have studied 5,000 tree sections, including some located this summer after years of search. The calendar up to this season had been carried back to 1260 A. D., and still was not old enough to match the series of years recorded at Pueblo Bonito. Another set of pre-Columbian tree-ring dates covered 586 years in some unknown centuries. The link between the two series has now been discovered, and the dates will soon be announced.

Science News-Letter, November 2, 1929

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CLASSICS OF SCIENCE:

Young on the Theory of Light

Physics

The following lecture is an excellent example of the way science may be advanced by an impartial editor who can bring together the results of a number of researches and fit them together into a new whole. It is a process which is becoming increasingly difficult at the present time on account of the constantly growing volume of scientific researches and the inadequacy of mechanical means of bringing them together for comparison.

To condense Young's lecture for presentation in a small space is not an easy task. The plan of the lecture is to state the outline in the form of hypothesis and proposition, and then to illustrate, rather than argue, with quotations from the leading thinkers on the subject, especially Newton. Since the context of these quotations is now so well known, it has seemed permissible to the present editor to abridge this section of the lecture, giving however Young's own contribution to the advancement of knowledge practically in full.

The Bakerian Lecture. ON THE THEORY OF LIGHT AND COLOURS. By Thomas Young, M. D., F.R.S., Professor of Natural Philosophy in the Royal Institution. *Philosophical Transactions of the Royal Society of London.* For the year MDCCCII (1802). Read November 12, 1801.

Although the invention of plausible hypotheses, independent of any connection with experimental observations, can be of very little use in the promotion of natural knowledge; yet the discovery of simple and uniform principles, by which a great number of apparently heterogeneous phenomena are reduced to coherent and universal laws, must ever be allowed to be of considerable importance towards the improvement of the human intellect.

The object of the present dissertation is not so much to propose any opinions which are absolutely new, as to refer some theories, which have been already advanced, to their original inventors, to support them by additional evidence, and to apply them to a great number of diversified facts, which have hitherto been buried in obscurity. Nor is it absolutely necessary in this instance to produce a single new experiment; for of experiments there is already an ample store, which are so much the more unexceptionable, as they must have been conducted without the least partiality for the system by which they will be explained; yet some facts, hitherto unobserved, will be brought forwards, in order to show the perfect agreement of that system with the multifarious phenomena of nature.

The optical observations of NEWTON are yet unrivalled; and, excepting some casual inaccuracies, they only rise in our estimation, as we compare them with later attempts to improve on them. A further consideration of



THOMAS YOUNG

the colours of thin plates, as they are described in the second book of NEWTON's optics has converted that prepossession which I before entertained for the undulatory system of light, into a very strong conviction of its truth and sufficiency; a conviction which has been since most strikingly confirmed, by an analysis of the colours of striated substances. The phenomena of thin plates are indeed so singular, that their general complexion is not without great difficulty reconcilable to any theory, however complicated, that has hitherto been applied to them; and some of the principal circumstances have never been explained by the most gratuitous assumptions; but it will appear, that the minutest particulars of these phenomena, are not only perfectly consistent with the theory which will now be detailed, but that they are all the necessary consequences of that theory, without any auxilliary suppositions; and this by inferences so simple, that they become particular corollaries, which scarcely require a distinct enumeration. . . .

Hypothesis I. A luminiferous Ether pervades the Universe, rare and elastic in a high degree.

Hypothesis II. Undulations are excited in this Ether whenever a Body becomes luminous.

Hypothesis III. The Sensation of different Colours depends on the different frequency of Vibrations, excited by Light in the Retina.

Hypothesis IV. All material Bodies have an Attraction for the ethereal Medium, by means of which it is ac-

cumulated within their Substance, and for a small Distance around them, in a State of greater Density, but not of greater Elasticity.

Proposition I. All Impulses are propagated in a homogeneous elastic Medium with an equable Velocity.

Scholium 1. It has been demonstrated, that in different mediums the velocity varies in the subduplicate ratio of the force directly, and of the density inversely.

Scholium 2. It is obvious, from the phenomena of elastic bodies and of sounds, that the undulations may cross each other without interruption. But there is no necessity that the various colours of white light should intermix their undulations; for, supposing the vibrations of the retina to continue but a five hundredth of a second after their excitement, a million undulations of each of a million colours may arrive in distinct succession within this interval of time, and produce the same sensible effect, as if all the colours arrived precisely at the same instant.

Proposition II. An Undulation conceived to originate from the Vibration of a single Particle, must expand through a homogeneous Medium in a spherical Form, but with different quantities of Motion in different Parts.

Proposition III. A Portion of a spherical Undulation, admitted through an Aperture into a quiescent Medium, will proceed to be further propagated rectilinearly in concentric Superficies, terminated laterally by weak and irregular Portions of newly diverging Undulations.

Proposition IV. When an Undulation arrives at a Surface which is the Limit of Mediums of different Densities, a partial Reflection takes place, proportionate in Force to the Difference of the Densities.

Proposition V. When an Undulation is transmitted through a Surface terminating different Mediums, it proceeds in such a Direction, that the Sines of the Angles of Incidence and Refraction are in the constant Ratio of the Velocity of Propagation in the two Mediums.

Corollary 1. The same demonstrations prove the equality of the angles of reflection and incidence.

Corollary 2. It appears from experiments on the refraction of condensed air, that (Turn to next page)

Young on the Theory of Light—Continued

the ratio of the difference of the sines varies simply as the density. Hence it follows, by Schol. 1, Prop. 1. that the excess of the density of the ethereal medium is in the duplicate ratio of the density of the air; each particle co-operating with its neighbours in attracting a greater portion of it.

Proposition VI. When an Undulation falls on the Surface of a rarer Medium, so obliquely that it cannot be regularly refracted, it is totally reflected, at an angle equal to that of its Incidence.

Proposition VII. If equidistant Undulations be supposed to pass through a Medium, of which the Parts are susceptible of permanent Vibrations somewhat slower than the Undulations, their Velocity will be somewhat lessened by this vibratory Tendency; and, in the same Medium, the more, as the Undulations are more frequent.

Corollary. It was long an established opinion, that heat consists in vibrations of the particles of bodies, and is capable of being transmitted by undulations through an apparent vacuum. This opinion has been of late very much abandoned. Count RUMFORD, Professor PICKETT, and Mr. DAVY, are almost the only authors who have appeared to favour it; but it seems to have been rejected without any good grounds, and will probably very soon recover its popularity.

Proposition VIII. When two Undulations, from different Origins, coincide either perfectly or very nearly in Direction, their joint effect is a Combination of the Motions belonging to each.

Proposition IX. Radiant Light consists in Undulations of the luminiferous Ether.

This proposition is the general conclusion from all the preceding; and it is conceived that they conspire to prove it in as satisfactory a manner as can possibly be expected from the nature of the subject. It is clearly granted by NEWTON, that there are undulations, yet he denies that they constitute light; but it is shown . . . that all cases of the increase or diminution of light are referable to an increase or diminution of such undulations, and that all the affections to which the undulations would be liable, are distinctly visible in the phenomena of light; it may therefore be very logically inferred, that the undulations are light.

A few detached remarks will serve to obviate some objections which may be raised against this theory.

1. NEWTON has advanced the singular refraction of the Iceland crystal, as an argument that the particles of light must be projected corpuscles; since he thinks it probable that the different sides of these particles must be differently attracted by the crystal, and since HUYGENS has confessed his inability to account in a satisfactory manner for all the phenomena. But, contrarily to what might have been expected from NEWTON's usual accuracy and candour, he has laid down a new law for the refraction, without giving a reason for rejecting that of HUYGENS, which Mr. HAUY has found to be more accurate than NEWTON's; and, without attempting to deduce from his own system any explanation of the more universal and striking effects of doubling spars, he has omitted to observe that HUYGENS's most elegant and ingenious theory perfectly accords with these general effects, in all particulars, and of course derives from them additional pretensions to truth: this he omits, in order to point out a difficulty, for which only a verbal solution can be found in his own theory, and which will probably long remain unexplained by any other.

2. Mr. MICHELL has made some experiments, which appear to show that the rays of light have an actual momentum, by means of which a motion is produced when they fall on a thin plate of copper delicately suspended. But, taking for granted the exact perpendicularity of the plate, and the absence of any ascending current of air, yet since, in every such experiment, a greater quantity of heat must be communicated to the air at the surface on which the light falls than at the opposite surface, the excess of expansion must necessarily produce an excess of pressure on the first surface, and a very perceptible recession of the plate in the direction of the light. Mr. BENNET has repeated the experiment, with a much more sensible apparatus, and also in the absence of air; and very justly infers from its total failure, an argument in favour of the undulatory system of light. For, granting the utmost imaginable subtlety of the corpuscles of light, their effects might naturally be expected to bear some proportion to the effects of the much less rapid motions of the electrical

fluid, which are so very easily perceptible, even in their weakest states.

3. There are some phenomena of the light of solar phosphori, which at first sight might seem to favour the corpuscular system; for instance, its remaining many months as if in a latent state, and its subsequent re-emission by the action of heat. But, on further consideration, there is no difficulty in supposing the particles of the phosphori which have been made to vibrate by the action of light, to have this action abruptly suspended by the intervention of cold, whether as contracting the bulk of the substance or otherwise; and again, after the restraint is removed, to proceed in their motion, as a spring would do which had been held fast for a time in an intermediate stage of its vibration; nor is it impossible that heat itself may, in some circumstances, become in a manner latent. But the affections of heat may perhaps hereafter be rendered more intelligible to us; at present, it seems highly probable that light differs from heat only in the frequency of its undulations or vibrations; those undulations which are within certain limits, with respect to frequency, being capable of affecting the optic nerve, and constituting light; and those which are slower, and probably stronger, constituting heat only; that light and heat occur to us, each in two predicaments, the vibratory or permanent, and the undulatory or transient state; vibratory light being the minute motion of ignited bodies, or of solar phosphori, and undulatory or radiant light the motion of the ethereal medium excited by these vibrations; vibratory heat being a motion to which all material substances are liable, and which is more or less permanent; and undulatory heat that motion of the same ethereal medium, which has been shown by Mr. KING, and M. PICTET, to be as capable of reflection as light, and by Dr. HERSCHEL to be capable of separate refraction. How much more readily heat is communicated by the free access of colder substances, than either by radiation or by transmission through a quiescent medium, has been shown by the valuable experiments of Count RUMFORD. It is easy to conceive that some substances, permeable to light, may be unfit for the transmission of heat, in the same manner as particular substances may transmit some kinds of light, while they are opaque with respect to others. (*Turn to next page*)

Trachoma Leading Cause of Blindness

Medicine

The chief cause of the nearly two and one-half million cases of blindness existing in the world today is trachoma, Lewis H. Carris, managing director of the National Society for the Prevention of Blindness, stated on his return from a world conference on blindness held at the Hague.

This disease is found in nearly every part of the globe, but it is at its worst in Oriental countries. It is most prevalent in Egypt and along the borders of the Mediterranean Sea, in Palestine, China, the Balkan States, India, the hot sections of Brazil, and, in our country, among the inhabitants of the Appalachian and Ozark Mountain districts and among American Indians.

Trachoma is a highly contagious disease. The roller towel has been the cause of many epidemics of the disease in industrial plants. A common family towel is also a potent spreader of the disease among members of the same household. Poverty, crowding and unsanitary living conditions are important factors in the contraction and spread of trachoma.

The disease causes redness, painful inflammation and granular growths, looking something like sago, within the lids. These irritate the cornea, producing ulcers and later scars. The scar formation may produce an opaque layer covering the pupil which results in loss of sight.

In individual cases the disease may be checked by proper treatment, but trachoma is so widespread that it cannot be entirely controlled until more is known of its cause. Dr. Hideyo Noguchi, working at the Rockefeller Institute for Medical Research, thought that he had found the organism or germ causing trachoma. Since his death the work has been continued, but further results have not yet been announced. Other investigators have considered diet a causative or predisposing factor.

The United States has for many years refused admission to immigrants showing symptoms of trachoma. The U. S. Public Health Service has been conducting extensive studies of the disease in the sections of this country where it is prevalent.

Science News-Letter, November 2, 1929

Rocket to Moon

Astronomy

Prof. H. Oberth, a German scientist living in Roumania, has secured the support of UFA, a German film company, for his research on a rocket to fly to the moon.

Professor Oberth was last spring awarded the Esnault-Pelterie-Hirsch prize given by the Astronomical Society of France for the most practical invention designed to promote interplanetary navigation.

Science News-Letter, November 2, 1929

Young on the Theory of Light—Continued

On the whole it appears, that the few optical phenomena which admit of explanation by the corpuscular system, are equally consistent with this theory; that many others, which have long been known, but never understood, become by these means perfectly intelligible; and that several new facts are found to be thus only reducible to a perfect analogy with other facts, and to the simple principles of the undulatory system. It is presumed, that henceforth the second and third books of NEWTON'S Optics will be considered as more fully understood than the first has hitherto been but, if it should appear to impartial judges, that additional evidence is wanting for the establishment of the theory, it will be easy to enter more minutely into the details of various experiments, and to show the insuperable difficulties at-

tending the Newtonian doctrines, which without necessity, it would be tedious and invidious to enumerate. The merits of their author in natural philosophy, are great beyond all contest or comparison; his optical discovery of the composition of white light, would alone have immortalized his name; and the very arguments which tend to overthrow his system, give the strongest proofs of the admirable accuracy of his experiments.

Thomas Young (1773-1829) was a physician by profession, although he took part in most of the scientific life of his time. At the age of 28 he was appointed Professor of Physics at the Royal Institution. During the following two years he gave 91 lectures, in which the famous ones on light were included. At the end of two years he gave up the professorship because it interfered with his practice of medicine.

Science News-Letter, November 2, 1929

To Unite Medicine

Medicine

Closer unity between the various branches of medicine will be brought about by the new Department of the History of Medicine and the William H. Welch Medical Library of Johns Hopkins University, prophesied Dr. Harvey Cushing, professor of surgery of Harvard University.

From being very compact in its early stages, medicine has become scattered among the various specialties of medical practice and of medical investigation and experiment. The medical students are now the only tie that holds all these branches together, Dr. Cushing said. But under the direction of Dr. Welch, in whose honor the new library was planned and named and for whom the new chair of the history of medicine has been created, the unification of medicine will surely begin.

The new library will be cultural, not merely vocational, and an active force rather than a passive collection of books and journals, Dr. Cushing declared. Dr. Welch long ago taught that the study of the history of the various medical doctrines broadens a physician's view and increases his perspective. This will be the guiding principle of the new institutions.

The new department is the first of its kind in America. The inauguration of it and the dedication of the library were made the occasion for the many friends and admirers of Dr. Welch, both in America and Europe, to pay the highest honors and tributes to this remarkable man who for over forty years has been an outstanding figure in the medical profession.

Science News-Letter, November 2, 1929

Drifts 7,000 Miles

Oceanography

Two unusually long bottle drifts have just been reported to the Hydrographic Office in Washington. One bottle, thrown overboard by Officer O. Haugstad of the Norwegian steamer Childar, was picked up among the Marshall Islands after having drifted about 6,000 miles. The second was found among the Caroline Islands after a drift of about 7,000 miles. This bottle was one thrown overboard by Second Officer R. M. Stall of the American steamer K. R. Kingsbury.

The longest drift in the records of the Hydrographic Office is one made between May 31, 1909, and May 19, 1912, of about 11,820 statute miles.

Science News-Letter, November 2, 1929

Distilling Manganese

Physiology

Distillation gets most of its publicity as a result of its more or less disreputable employments; but it achieves most of its real usefulness in the world in technical laboratories few people ever hear about, at tasks which only chemists can think up for it. Its newest job is to get manganese, one of steel's most important alloying agents, out of its ores in an almost absolutely pure condition. An improved apparatus for doing this was described at a meeting of the Metallurgical Advisory Board by Dr. James B. Friauf.

Distillation of any kind depends on boiling the material to be purified, and then condensing the steam or vapor. This is simple enough with water, which boils at 100 degrees Centigrade, and with alcohol, which boils at an even lower temperature. But the boiling point of manganese at atmospheric pressure is about 1,900 degrees, and even in an almost complete vacuum it is still in the neighborhood of 1,000.

To accomplish this difficult distillation, Dr. Friauf encloses a magnesia crucible full of manganese ore in a chamber of fused silica. Around the crucible is a coil of water-cooled wire, through which a high-tension, high-frequency alternating current is passed. This induces what are known as "eddy currents" within the coil, and this induced electricity heats the manganese in the ore above its boiling point, causing it to pass off as a vapor. The gaseous manganese rises from the crucible through a magnesium chimney, and condenses into a solid again on its cooler walls. From there it is recovered as a solid metal, so hard that it can scratch glass.

Science News-Letter, November 9, 1929

New 300-Foot Falls

Geography

The sudden birth of a towering waterfall 300 feet high is reported from Iceland by an English traveler writing from Reykjavik. It is due to the breaking down of an ice dam across a lake on top of the glacier-capped mountain known as Lang Jökull, which lies in western Iceland not far from the famous Geysir, first known of all geysers of the world.

According to the statements of farmers in the neighborhood, the lake burst its glacial barrier during the course of a single night with a noise like thunder, and so flooded the little river Tungufjot that it carried out a concrete bridge.

Science News-Letter, November 2, 1929

Biology

is the study of living things

The interest of the student is always stimulated by observing living forms and he should be encouraged to collect and bring to the laboratory live specimens to be placed in the aquarium or vivarium.

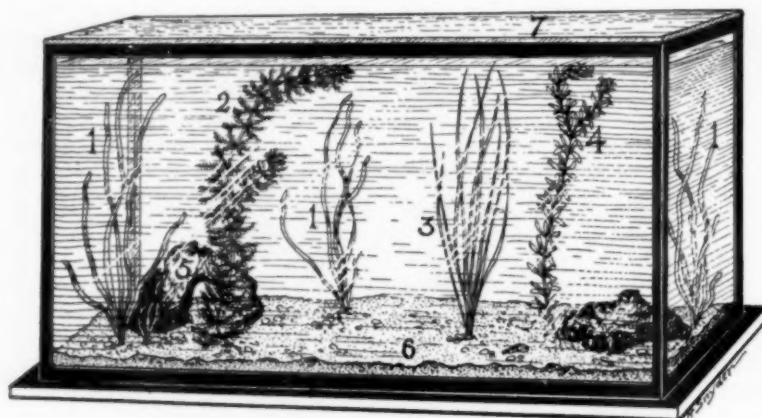


Diagram to show proper planting of a 9-gallon aquarium tank

- | | |
|-----------------|-------------------------|
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"Mind Cure" Now Scientific

Psychology

"Mind cure" is rising from the realm of quackery and becoming a part of scientific medicine, Dr. William A. White, superintendent of St. Elizabeth's Hospital, Washington, D. C., told physicians at the second annual Graduate Fortnight of the New York Academy of Medicine. In properly selected cases, properly trained physicians are able to cure disease by treating the minds of the patients, Dr. White explained.

"One of the most general functions of the human mind is to smooth out inequalities of emotional balance. The healthiest and most normal mind is the mind which is most continuously in a state of emotional equilibrium," Dr. White stated. "A person whose emotions are evenly balanced

does not see things out of focus. He is not overly anxious or overly solicitous. He is not too severe nor too complacent. His emotions are reasonably adjusted to the situation as it actually is. He does not see enmity and antagonism where it does not exist, nor does he fear dangers which are only made of thin air." The psychotherapist should have a mind of such type.

"The whole psychotherapeutic movement is tending in the direction of facts rather than, as in the past, in the direction of mysticism," Dr. White said. He then explained the present trends followed by psychotherapy, the scientific "mind cure."

Science News-Letter, November 2, 1929

"Rescue Vest" To Prevent Drownings

Aviation

A new oxygen-breathing device has just been perfected, intended to prevent the drowning of aviators trapped by seaplanes that crash in the water, or caught under their parachutes after a jump that brings them down into a river or the sea. It is the joint work of Chief Gunner C. L. Tibbals, well known for his inventions of submarine safety devices, and Frank H. Hobson of the Naval Bureau of Construction and Repairs. As yet it has received no official name, but is provisionally called the seaplane rescue safety vest.

Mr. Tibbals describes the new contrivance as "a sort of combined vest and belt equipped with two long pieces of rubber hose, through one of which the wearer inhales and through the other exhales; a nose-clamp to prevent the sudden rush of water from suffocating him; a tiny canister containing soda lime, which serves to purify the breath while eliminating carbon dioxide, and a bottle containing sufficient oxygen to keep a man afloat for at least half an hour after he has jumped into the water from his chute. However, if it so happens that the flier has not had a chance to use his parachute and therefore hits the water while in the plane, he can readily gain access to a larger bottle always carried as an emergency measure in the ship. This will supply a human being for about an hour and a half."

All told, Mr. Tibbals explains, there are eleven potential uses of the new

vest: for flyers whose parachute carries them into a body of water; for aviators who crash into the water while in the plane itself; for flyers trying for high altitude records; as an emergency apparatus for seaplanes that have regular water routes; for land planes that have to pass frequently over large bodies of water; as a gas mask in actual aerial combat; for army squadrons crossing narrow streams under conditions that make it advisable for the soldiers to duck under the water so as to stay hidden from the enemy; for aviators who tend to become asphyxiated from a sudden, large-scale leakage of gasoline; as an emergency rescue apparatus for accidents in the water, like those near speed-boat or swimming races; as a respiratory apparatus to be used in connection with flameproof clothing in case of fire; and as a rescue device for rescue crews going to the aid of seaplanes that have crashed.

Science News-Letter, November 2, 1929

Porto Rico, which has only about five per cent. of its area in native forests, is rapidly being reforested.

An attempt is being made to save for museums the crude pictures scratched and painted on the rocks by Western Indians.

Success of the Belgians in domesticating elephants in African colonies has caused the French to undertake the same work.

NATURE RAMBLINGS

By FRANK THONE



Crappie

A relative of the black bass but not so great a fighter, the crappie or croppie is more or less of a disputed fish. In the North fishermen do not care much for it, because it is found so much of the time in muddy water, and its flesh is flavored by its environment. But when it can be found in clear water it is really a first-class panfish, to which no person with a good palate for fish could possibly find objection.

Another objection advanced against the crappie is that it is "paper-mouthed", tearing out the hook easily when caught. But other fishermen, especially in the South, answer that this is really an advantage, necessitating real skill in the handling of one's tackle.

Since the crappie has a very wide range and is very abundant, it has acquired an imposing array of aliases. Jordan and Everman, in their book on American food and game fishes, list these: bachelor, campbellite, new-light, tin-mouth, paper-mouth, sac-à-lait, chinquapin perch, bridge perch, speckled perch, goggle-eye and John Demon. It has also borrowed the names of two other fish, being known as shad and calico bass.

In spite of the lack of agreement among fishermen over the merits of the crappie, the U. S. Bureau of Fisheries has no doubts about its value. Along the Mississippi and other central rivers their men spend a great deal of time each spring rescuing young crappies from drying-out overflow bayous and planting them in waters where their chances for survival are good.

Science News-Letter, November 2, 1929

P. BLAKISTON'S SON & CO. INC. Publishers
1012 Walnut St. PHILADELPHIA

HACKH'S

Chemical Dictionary



THE great progress of chemistry in recent years and its resulting, intensified specialization has emphasized the need for a dictionary which records the old and new phenomena in the terms of *our new concepts of matter and energy*.

This book is planned on broad lines. It is not a mere compilation or collection of facts, but it restates and redefines in simple, modern terms, the phenomena of the science, and connects these phenomena with each other. The author provides a number of original charts and diagrams which give a clearer conception of the subject and will prove of great practical value.

The work is offered as a modern, clear and concise description of the theories, laws and rules; elements, compounds, minerals, drugs, vegetable and animal products; reactions, processes, methods; apparatus, equipment, instruments, and biographical data with portraits. The collateral vocabulary of physics, astrophysics, geology, mineralogy, botany, zoology, medicine and pharmacy, also industry, mining and commerce has been included in so far as these terms are pertinent to the field of chemistry.

During the preparation of the work, the author received important information from a number of eminent chemists and scientists. The entire manuscript has been reviewed by Dr. Julius Grant, M.Sc., F.I.C., of London who, by embodying numerous terms which reflect British usage, has given the book an international character.

By INGO W. D. HACKH

Professor of Chemistry, College of Physicians and Surgeons, San Francisco;

Author of "Chemical Reactions and Their Equations"

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New Type Cruisers Under-Armored

Naval Architecture

The newest types of 10,000-ton fighting ships, including both the "Treaty" cruisers and the sensational "Ersatz" armored ships of the German navy, are sacrificing essential armor protection for excessive gun power and, in the case of the cruisers, for excessive speed. This is the opinion of William Hovgaard, professor of naval design at the Massachusetts Institute of Technology, as expressed recently before the Institution of Naval Architects in Italy.

Prof. Hovgaard pointed out that neither class carries armor heavy enough to stop shells from 8-inch guns, and it is his thesis that any warship should be heavily enough protected to resist the fire of another ship of her own class. The "Treaty" cruisers all have protective decks of varying thickness—two inches might be given as an average—and their side armor varies from none at all to five or six inches. Only the heaviest of this armor, in Prof. Hovgaard's opinion, is even fairly well able to

cope with the attack of an 8-inch gun at battle ranges. He calls attention to the dangerously light armor carried by the British pre-war battle cruisers, as compared with the more adequate protection of the German ships of the same class, and the significant re-designing of the British battle cruiser type after the battle of Jutland.

He would draw upon the weight now spent on guns and propulsion machinery to remedy this condition. No "Treaty" cruiser now carries less than eight 8-inch guns, and the American ships of this class are to be armed with nine or ten. All of the cruisers are engaged to make speeds of from 32 to 36 knots, which the Massachusetts naval designer considers unnecessarily high. The speed of the German "Ersatz" ships is to be lower, 26 knots, but to offset this they will carry six 11-inch and eight 6-inch guns apiece—a tremendous battery for a displacement of only 10,000 tons.

Prof. Hovgaard suggests cutting down the number of 8-inch guns to six, reducing the speed somewhat, and investing the weight thus saved in thicker armor and a more complete torpedo defense. He argues that such a ship could stand up against an 8-inch gun cruiser mounting more artillery, take a good many blows and still be able to continue fighting, while her more thinly armored adversary would feel terrifically the effect of every shell received.

Commenting on the new German ships, Prof. Hovgaard said: "The 'Ersatz-Preussen' must be regarded as a compromise adopted under compelling limitations, but the exceptional circumstances under which it appears are remarkably favorable. In the Baltic she will be supreme, except for the presence of a few relatively slow Russian battleships, and on the ocean she will be either much more powerful or else much faster than any other vessel, with the sole exception of a few battle-cruisers."

Science News-Letter, November 2, 1929

Animal Mummies Costly

Archaeology

Nearly one hundred different mammals, birds, reptiles, and fish were regarded as sacred to various gods in ancient Egypt, and their bodies were mummified by thousands. Prof. Roy L. Moodie has found while investigating this subject for the Field Museum of Chicago.

The cost of this religious procedure was enormous. More than two hundred yards of fine linen cloth, a half yard wide, were needed for the wrapping of a single bull. As bulls were held in extreme veneration by the ancient Egyptians, great numbers of them were preserved. Expensive sarcophagi carvings and statuary show the further care of the African bull.

Birds of the hawk and falcon type were also abundantly preserved, as was the Egyptian kite, a small scavenger seen today perched on house tops and in trees near villages. Packages contain as many as forty birds, each mummified and dipped in pitch before wrapping.

All of the animal species mummified are known to be still living, and the mummies provide evidence that such species have existed for many thousand years.

Science News-Letter, November 2, 1929

Indians Cremated

Anthropology

Proof that prehistoric Indians of the Mimbres Valley, New Mexico, sometimes cremated their dead has been found beneath the floors of ancient Indian dwellings by Dr. A. E. Jenks, who directed the Mimbres expedition of the University of Minnesota and the Minneapolis Institute of Fine Arts this season. The ways of these departed Indians are of exceptional interest because their pottery was the most beautiful and unusual of any made in the Southwest and yet other objects found in Mimbres ruins show no signs of extraordinary artistry or culture.

One burial found under the floor of an ancient dwelling revealed that the bones of the Indian had been broken into small fragments and burned. They were in a bowl beautifully painted brown and decorated with a slender interlocking scroll sometimes called the "friendship pattern," Dr. Jenks says. With the bones were two shell finger rings, a bracelet, and charred beads. Five other pieces of typical Mimbres pottery accompanied the burial jar, after the Indian custom of placing ornaments and useful articles in a grave.

Another similar cremation burial

was in a red and white water jar six inches high. A unique feature of this burial, Dr. Jenks points out, was that the water jar rested on nine pebbles constituting a base. Four other pieces of the beautiful Mimbres pottery were with the water jar.

Science News-Letter, November 2, 1929

Sick Crocodiles

Parasitology

African crocodiles can harbor a form of sleeping sickness from the tsetse fly, but this is not the human type. The crocodile gets the disease by sleeping with his mouth open, thus permitting the flies to walk around and bite the soft membranes exposed. The disease is not transferred in the bite, but may be transferred if the beast wakes up irritated and snaps at the flies, thus crushing them and swallowing the parasites or germs carrying the disease. This particular germ requires the crocodile and the fly to complete its life cycle just as a malarial parasite requires man and the mosquito. These facts were determined by Cecil A. Hoare, of the Wellcome Bureau of Scientific Research.

Science News-Letter, November 2, 1929

FIRST GLANCES AT NEW BOOKS

THE SOURCES OF A SCIENCE OF EDUCATION—John Dewey—*Liveright* (\$1.50). Reflections and wise counsel on the development of a science of education and the relationship of the various sciences to education, by one of the foremost of America's teachers. The little book should provide inspiring reading for anyone seriously interested in the progress of education, and might be read with special profit by the growing school of modernist educators who are in great haste to apply psychological and other scientific discoveries to the daily routine of the schoolroom.

Education

Science News-Letter, November 2, 1929

AVIATION FROM THE GROUND UP—G. B. Manly—*Drake* (\$3.50). An introduction and reference book written "not for the technician, the aeronautical engineer or the seeker after technical detail, but for the everyday man who wants to learn the practical side of aviation."

Aeronautics

Science News-Letter, November 2, 1929

A CHILD'S GEOGRAPHY OF THE WORLD—V. M. Hillyer—*Century* (\$3.50). The boy or girl of nine or thereabouts could have no more happy introduction to geography than by way of this attractive book. The author's style is lively, the maps and drawings are clever, and with it all the book contains a liberal education in the details that geographies are supposed to cover and much picturesque information that most geographies overlook.

Geography

Science News-Letter, November 2, 1929

PROGNOSIS TESTS IN THE MODERN FOREIGN LANGUAGES—By eight authors—*Macmillan* (\$.75). Another of the reports prepared for the Modern Foreign Language Study and the Canadian Committee on Foreign Languages. The goal of the investigation reported here is to find a method of predicting success or failure of prospective language students in public school and college. Eight studies dealing with 2,000 pupils are described, and if no eminently satisfactory test has been perfected, still various tests in use have been scrutinized and improved and there is better understanding of the abilities required for mastery of languages.

Education

Science News-Letter, November 2, 1929

LORE AND LEGENDS OF THE KLAMATH RIVER INDIANS—Charles S. Graves—*Press of the Times, Yreka, Calif.* (\$2, plus postage). Stories handed down by the Indians from father to son reveal the inner thoughts and feelings of the red men, which the white men have only too often misunderstood or entirely disregarded. The Klamath Indians of northwest California who told these stories of love, courage, and faith, are one of the vanishing groups that is perhaps less well known to the public than some tribes. The book is illustrated with pictures of Indians who permitted themselves to be photographed in native costume.

Anthropology

Science News-Letter, November 2, 1929

THE CHILD: HIS NATURE AND NEEDS—*The Children's Foundation* (\$1). For parents, teachers and social workers, The Children's Foundation has compiled a book on knowledge of child nature, child well-being and education, so that those who deal with children will have all our present knowledge to aid them. The various chapters are written by authorities, and the whole is edited by Professor M. V. O'Shea of the University of Wisconsin.

Child Care

Science News-Letter, November 2, 1929

THE COMMON HEAD COLD—Walter A. Wells—*Macmillan* (\$2.75). The "common" cold may be common but it is far from being unimportant, either to the individual or to the community or to industry. Dr. Wells explains for the layman how we get colds, the predisposing causes, atmospheric factors, relations between germs and colds, and, best of all, how to prevent colds and what to do, in general, when we have got one. Adenoids, tonsils, sinuses and the voice apparatus are also discussed. Surg.-Gen. Hugh S. Cumming of the United States Public Health Service has written an introduction for this book, which is sure to find popularity.

Medicine

Science News-Letter, November 2, 1929

HEALTHFUL LIVING—S. E. Bilik—*Scribners* (\$2.50). Breezily written advice on health, with plenty of space devoted to exercise, diet and reducing.

Physiology

Science News-Letter, November 2, 1929

THEORETICAL BIOLOGY—J. Von Uexküll—*Harcourt, Brace*. This is a book for scholars, a careful, critical, comprehensive examination of the present status of the theoretical bases of modern biology. It is not for undergraduates, but their teachers will appreciate it greatly. Von Uexküll's views are not always orthodox, but where they are not they are highly stimulating—which is, perhaps, much more desirable.

Biology

Science News-Letter, November 2, 1929

MEDICAL LEADERS—Samuel W. Lambert and George M. Goodwin—*Bobbs-Merrill* (\$5). Medical history told through the lives and personalities of the great leaders of medicine from Hippocrates to Osler. The heroic tale, well told in this volume, should be widely read and known.

Medicine

Science News-Letter, November 2, 1929

THE ROAD TO HEALTH—C.-E. A. Winslow—*Macmillan* (\$2). In the Jayne Foundation lectures for 1929, Dr. Winslow explains briefly but clearly the effects of environment and of personal hygiene on man's health. The last lecture takes up that much-discussed subject of the place of the physician in the modern state.

Physiology

Science News-Letter, November 2, 1929

SCIENCE AND THE WAY TO HEALTH—J. Mace Andress and Maud A. Brown—*Ginn* (\$1). Two experienced educators have written a book which combines effectively instruction in physiology, hygiene, and disease prevention.

Physiology

Science News-Letter, November 2, 1929

EAT AND BE HAPPY—Josiah Oldfield—*Appleton* (\$1.50). A mixture of sense and nonsense about food and eating. Dr. Oldfield is a "Fruitarian" which is akin to being a vegetarian in American terms.

Physiology

Science News-Letter, November 2, 1929

THE WITNESS WINDOW—Charles Barry—*Dutton* (\$2). One of the liveliest and cleverest of the new detective stories. The publishers would have been safe to have offered one hundred dollars to any reader who would have solved the problem after having read no more than the first half of the book. Yet the solution is clear and convincing when it comes.

Fiction

Science News-Letter, November 2, 1929